Plan for light sealing long extrusion edges

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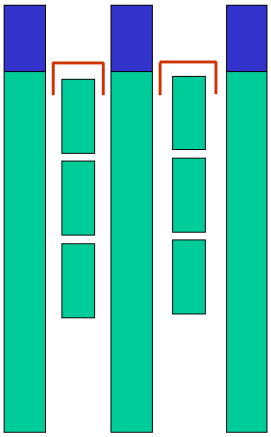
Given that the extrusions may have some transparency, and it may be necessary to seal the outer edges of the modules from light. I present an outline of a possible method of sealing out light.

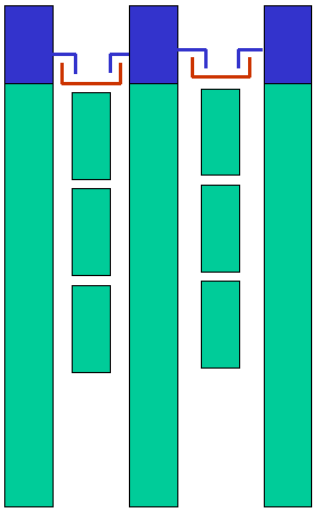
The long edges of the extrusions will have a large effect with even a small transmission. Rather than seal all the extrusions, it may be cost effective to seal only the outer edges from light.



BLUE—Manifold
Green—Extrusion
Red—Black Plastic

The schematic figure to the left shows 3 vertical planes and two horizontal planes. It indicates in red the minimal extra light barrier, extending the length of 15.7m into the page. This barrier would be applied at plane assembly time as a 30cm x 15.7m ribbon of plastic after plane 1 was laid down.
Once plane 2 is in place, the plastic is flipped over and can be temporarily held in place with a few pieces of tape until it is captured by plane 3, and its epoxy.

This scheme can also be used at the vertical edges, and taking advantage of the continuous regions that do not need access, the “feet” and edges, it could span many planes, maybe an entire 8 plane sub-block.



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There are many possible variations to this scheme which can also be evaluated. It is possible that instead of capturing the plastic between planes that the connection could go between the manifolds. Manifold ends that are extruded or injection molded could have additional features that could capture a light barrier of this type. The

second figure shows one possible scheme. The light barrier could also be taped directly to the manifold instead of having the extra manifold features. The features would not have to be continuous and perfectly aligned either. They can have small discontinuities that could be sealed with a small amount of tape. I prefer the added features as these provide a robust barrier to light leakage that would not be compromised by wrinkles in the plastic barrier.

Further still, one could wrap an additional layer over the back of the manifold if that turned out to have frequent problems. With the overlapping seal that is currently planned I doubt that would be necessary.

This method would provide a good seal along the large exposed edges of the detector, eliminating serious light leaks, and the need for a coextrusion over the entire area of the module, most of which is already in the dark. There is always a transition problem in this type of system, but I don't think this is a serious problem here. If the plastic on the top or the side is cut slightly longer than needed, the ends can be wrapped like the end of a birthday present and taped to the orthogonal view at the foot end, or to the manifold at the head end.

There is yet another feature, two thin flanges that could be added to the injection molded parts at the ends of the manifold that would capture the neighboring manifold. This would help to provide a continuous seal at the manifold end, eliminating a light path in between modules at the manifold end.

Eliminating light leaks by design is much easier than anything after the fact. We will have about 2000 planes, and we need to do this efficiently.